

**Table 2-H-4c**  
**Bay Area to Merced – High-Speed Train Alignment Evaluation Matrix**  
**Oakland to San Jose Segment**

**Alignment** = Alignment Carried Forward    **Alignment** = Alignment Eliminated      = Primary/Secondary Reason for Elimination

Evaluation Criteria	Alignments							
	Mulford Line (Entire Segment)	Hayward/ Niles/ Mulford	WPRR/Niles /Mulford	Hayward/ Tunnel/ Mulford	WPRR/ Tunnel/ Mulford	I-880 (Entire Segment)	Hayward/ I-880	WPRR/ Hayward/ I-880
<i>Maximize Ridership/Revenue Potential.</i>								
<b>Travel Time</b>	<b>3</b> 31 min.	<b>2</b> 34 min.	<b>1</b> 37 min.	<b>4</b> 27 min.	<b>3</b> 30 min.	<b>3</b> 32 min.	<b>5</b> 25 min.	<b>4</b> 28 min.
<b>Length</b>	<b>5</b> 42.3 miles (26.4 km)	<b>3</b> 46.2 miles (28.9 km)	<b>3</b> 48.8 miles (30.5 km)	<b>5</b> 42.2 miles (26.4 km)	<b>4</b> 44.8 miles (28.0 km)	<b>5</b> 42.0 miles (26.3 km)	<b>5</b> 41.8 miles (26.1 km)	<b>4</b> 44.4 miles (27.8 km)
<i>Minimize Operating and Capital Costs.</i>								
<b>Length</b>	<b>5</b> 42.3 miles (26.4 km)	<b>3</b> 46.2 miles (28.9 km)	<b>3</b> 48.8 miles (30.5 km)	<b>5</b> 42.2 miles (26.4 km)	<b>4</b> 44.8 miles (28.0 km)	<b>5</b> 42.0 miles (26.3 km)	<b>5</b> 41.8 miles (26.1 km)	<b>4</b> 44.4 miles (27.8 km)
<b>Operational Issues</b>	<b>2</b> <ul style="list-style-type: none"> <li>Restrictive curves on aerial structure above residential areas.</li> <li>Passes through Wildlife Refuge</li> </ul>	<b>2</b> <ul style="list-style-type: none"> <li>Passes through Wildlife Refuge.</li> <li>Very restrictive curves on Niles connector.</li> <li>2 industrial freight sidings need to be eliminated</li> </ul>	<b>1</b> <ul style="list-style-type: none"> <li>Passes through Wildlife Refuge.</li> <li>Very restrictive curves on the Niles connector &amp; some speed restrictions on WPRR aerial segment</li> </ul>	<b>3</b> <ul style="list-style-type: none"> <li>Passes through Wildlife Refuge.</li> <li>2 industrial freight sidings need to be eliminated</li> </ul>	<b>3</b> <ul style="list-style-type: none"> <li>Passes through Wildlife Refuge</li> </ul>	<b>3</b> <ul style="list-style-type: none"> <li>Restrictive curves on I-880 north of Fremont</li> </ul>	<b>4</b> <ul style="list-style-type: none"> <li>2 industrial freight sidings need to be eliminated</li> </ul>	<b>4</b> <ul style="list-style-type: none"> <li>Some speed restrictions on the WPRR aerial segment</li> </ul>

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	Mulford Line (Entire Segment)	Hayward/ Niles/ Mulford	WPRR/Niles /Mulford	Hayward/ Tunnel/ Mulford	WPRR/ Tunnel/ Mulford	I-880 (Entire Segment)	Hayward/ I-880	WPRR/ Hayward/ I-880
<b>Construction Issues</b>	<b>1</b> <ul style="list-style-type: none"> <li>Construction of footings adjacent to railroad and to private ROW</li> <li>Structure through Wildlife Refuge</li> </ul>	<b>3</b> <ul style="list-style-type: none"> <li>Potential for rated use.</li> <li>Structure through Wildlife Refuge.</li> <li>Trench section in Niles connector</li> <li>Existing commuter rail service</li> </ul>	<b>1</b> <ul style="list-style-type: none"> <li>Structure through Wildlife Refuge.</li> <li>Trench section in Niles connector.</li> <li>Modifying BART Structure to allow for high-speed train s</li> <li>Alignment changes from one side to other</li> </ul>	<b>2</b> <ul style="list-style-type: none"> <li>Structure through Wildlife Refuge</li> <li>Tunnel construction through Fremont</li> </ul>	<b>2</b> <ul style="list-style-type: none"> <li>Structure through Wildlife Refuge</li> <li>Tunnel construction through Fremont</li> </ul>	<b>2</b> <ul style="list-style-type: none"> <li>Constructing aerial structure in median of I-880.</li> <li>Widening highway at northern end</li> </ul>	<b>2</b> <ul style="list-style-type: none"> <li>Constructing aerial structure in median of I-880.</li> <li>Tunnel beneath Fremont Central Park</li> </ul>	<b>1</b> <ul style="list-style-type: none"> <li>Constructing aerial structure in median of I-88</li> <li>Tunnel beneath Fremont Central Park</li> <li>Modifying BART Structure</li> </ul>
<b>Capital Cost</b>	<b>2</b> <ul style="list-style-type: none"> <li>Approx. \$250 million more.</li> </ul>	<b>5</b> <ul style="list-style-type: none"> <li>Least costly</li> </ul>	<b>4</b> <ul style="list-style-type: none"> <li>Least costly</li> </ul>	<b>1</b> <ul style="list-style-type: none"> <li>Approx. \$500 more</li> </ul>	<b>1</b> <ul style="list-style-type: none"> <li>Approx. \$500 more</li> </ul>	<b>2</b> <ul style="list-style-type: none"> <li>Approx. \$250 million more.</li> </ul>	<b>5</b> <ul style="list-style-type: none"> <li>Least costly</li> </ul>	<b>4</b> <ul style="list-style-type: none"> <li>Least costly</li> </ul>
<b>Right-of-Way Issues/Cost</b>	<b>2</b> <ul style="list-style-type: none"> <li>Approx. three times the lowest cost</li> <li>Acquiring UPRR ROW &amp; easement.</li> <li>Acquiring 50-foot wide strip of private property</li> </ul>	<b>4</b> <ul style="list-style-type: none"> <li>Approx. twice the lowest cost</li> <li>Acquiring UPRR ROW &amp; easement.</li> <li>Acquiring 2 freight sidings</li> </ul>	<b>4</b> <ul style="list-style-type: none"> <li>Approx. twice the lowest cost</li> <li>Acquiring UPRR ROW &amp; easement.</li> </ul>	<b>3</b> <ul style="list-style-type: none"> <li>Acquiring UPRR ROW &amp; easement.</li> <li>Acquiring 2 freight sidings</li> </ul>	<b>3</b> <ul style="list-style-type: none"> <li>Acquiring UPRR ROW &amp; easement.</li> </ul>	<b>1</b> <ul style="list-style-type: none"> <li>Most costly</li> <li>Acquiring strip of ROW for highway widening north of Fremont</li> </ul>	<b>5</b> <ul style="list-style-type: none"> <li>Least costly</li> <li>Acquiring 2 freight sidings</li> </ul>	<b>5</b> <ul style="list-style-type: none"> <li>Least costly</li> <li>Acquiring UPRR ROW</li> </ul>

Evaluation Criteria	Alignments							
	Mulford Line (Entire Segment)	Hayward/ Niles/ Mulford	WPRR/Niles /Mulford	Hayward/ Tunnel/ Mulford	WPRR/ Tunnel/ Mulford	I-880 (Entire Segment)	Hayward/ I-880	WPRR/ Hayward/ I-880
Maximize Compatibility with Existing and Planned Development.								
Land Use Compatibility and Conflicts	1	3		2		5		
	<ul style="list-style-type: none"><li>Acquisition of 50-foot strip of private property</li><li>Within existing transportation corridor</li><li>Conflicts with expansion potential of existing rail service providers</li></ul>	<ul style="list-style-type: none"><li>Within existing transportation corridor</li><li>Conflicts with expansion potential of existing rail service providers</li></ul>		<ul style="list-style-type: none"><li>Conflicts with expansion potential of existing rail service providers</li><li>Requires subsurface easements for tunnel</li></ul>		<ul style="list-style-type: none"><li>Within existing transportation corridor</li></ul>		
Visual Quality Impacts	1	3				4	4	
	<ul style="list-style-type: none"><li>Visual impact to residential homes</li><li>Visual impact in Santa Clara business district &amp; in historic Alviso</li></ul>					<ul style="list-style-type: none"><li>Visual impact from high aerial structure in I-880 north of Fremont</li></ul>	<ul style="list-style-type: none"><li>Visual impact from transition aerial structure near Mission Boulevard</li></ul>	
	<ul style="list-style-type: none"><li>Visual impact from guideway over private property</li></ul>	(see above)						
Minimize Impacts on Natural Resources.								
Water Resources	1	1	1	3	3	5	5	5
# of crossing of alignment (linear ft of alignment centerline)	40 (2,000)	40 (2,000)	39 (1,950)	32 (1,600)	31 (1,550)	23 (1,150)	22 (1,100)	21 (1,050)
Floodplain Impacts	1	3	3	5	5	2	4	4
# of 100 yr. floodplain crossings	18	18	19	17	15	22	22	23
Length of alignment within 100 yr. floodplain	16,963	12,717	12,605	8,571	8,100	13,286	9,592	9,480
Percent of total length within floodplain	26.9%	18.3%	18.1%	13.5%	12.8%	21.2%	15.3%	15.0%

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<b>Threatened &amp; Endangered Species Impacts</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>1</b>
# of threatened & endangered species (per CNDDB)	5	4	5	2	3	3	3	5
# Federal Endangered	3	3	4	2	2	2	3	4
# Federal Threatened	2	1	1	0	1	1	0	1
# State Endangered	1	1	2	1	1	1	1	1
# State Threatened	0	0	0	0	0	0	0	0
Area of Alignment within Sensitive Habitat (per CNDDB)	382,631	320,615	313,301	262,483	271,282	221,455	255,921	464,067
<i>Minimize Impacts on Social and Economic Resources.</i>								
<b>Environmental Justice Impacts (Demographics)</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>2</b>	<b>3</b>
# Block groups >50 percent minority	63	66	63	63	59	52	59	55
# Block groups >50 percent low-income	0	0	1	0	1	1	1	2
Potentially affected minority population	13,090	16,689	15,285	15,427	13,956	11,405	15,791	14,321
Potentially affected low-income population	0	0	0	0	0	14	14	14
<b>Farmland Impacts</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>4</b>	<b>4</b>
Area of prime farmland (square meters)	48,099	12,875	12,875	12,947	12,947	30,489	54,805	54,805
Area of unique farmland (square meters)	45,569	38,605	38,605	0	0	0	0	0
Area of farmland of Statewide importance (square meters)	3,988	3,988	3,988	3,988	3,988	0	0	0
<i>Minimize Impacts on Cultural Resources.</i>								
<b>Cultural Resources Impacts</b>	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

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<b>Parks &amp; Recreation/ Wildlife Refuge Impacts</b>	1	1	1	1	1	5	3	3
	<ul style="list-style-type: none"> <li>• Passes through Don Edwards National Wildlife Refuge</li> <li>• Extremely Sensitive biological resource area</li> </ul>						<ul style="list-style-type: none"> <li>• - Passes through Fremont Central Park Lake</li> </ul>	
Wetlands (sites/area)	35/60.6 ac	24/49.9 ac	24/49.9 ac	28/52.3 ac	28/52.3 ac	12/5.7 ac	13/13.8 ac	13/13.8 ac
<i>Maximize Avoidance of Areas with Geologic and Soils Constraints.</i>								
<b>Soils/Slope Constraints</b>	5	3	3	4	4	4	4	4
Area of Highly Erodible Soils (square meters)	759,411	1,261,971	1,271,056	1,256,284	1,270,645	1,148,815	1,270,251	1,279,336
Area of High Shrink/Swell Soils (square meters)	1,740,288	1,933,528	1,973,293	1,737,344	1,767,536	1,714,710	1,725,691	1,750,639
Area of Steep Slopes - greater the 9 percent (square meters)	0	0	0	0	0	0	0	0
<b>Seismic Constraints</b>	4	3	2	1	1	5	3	2
	<ul style="list-style-type: none"> <li>• Silver Creek Fault 3 times</li> </ul>	<ul style="list-style-type: none"> <li>• Silver Creek Fault once</li> <li>• Hayward Fault twice</li> </ul>	<ul style="list-style-type: none"> <li>• Silver Creek Fault once</li> <li>• Hayward Fault 3 times</li> </ul>	<ul style="list-style-type: none"> <li>• Silver Creek Fault once &amp; adjacent to Hayward Fault in Fremont</li> </ul>	<ul style="list-style-type: none"> <li>• Silver Creek Fault once &amp; adjacent to Hayward Fault for several miles</li> </ul>	<ul style="list-style-type: none"> <li>• Cross Silver Creek Fault once</li> </ul>	<ul style="list-style-type: none"> <li>• Silver Creek Fault once</li> <li>• Hayward Fault twice</li> </ul>	<ul style="list-style-type: none"> <li>• Silver Creek Fault once</li> <li>• Hayward Fault 3 times</li> </ul>
	<ul style="list-style-type: none"> <li>• All high-speed train facilities would be designed taking into account existing soil, groundwater, and geologic conditions in the area and to withstand maximum credible earthquakes from fault activity in the area.</li> </ul>							

1    2    3    4    5  
Least Favorable                      Most Favorable